Open IPTV Forum – Release 1 Specification

Volume 3 – Content Metadata

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Open IPTV Forum

.

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This specification provides multiple options for some features. The Open IPTV Forum Profiling specification will complement the Release 1 specifications by defining the Open IPTV Forum implementation and deployment profiles. Any implementation based on Open IPTV Forum specifications that does not follow the Profiling specifications cannot claim Open IPTV Forum compliance.

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Foreword

This Technical Specification (TS) has been produced by the Open IPTV Forum.

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This document is Volume 3 in the 7 Volume set of specifications that define the Open IPTV Forum Release 1 Solution. The other Volumes in the set are:

- Volume 1 - Overview

- Volume 2 - Media Formats

- Volume 4 - Protocols

- Volume 5 - Declarative Application Environment

- Volume 6 - Procedural Application Environment

- Volume 7 – Authentication, Content Protection and Service Protection

.

1 References

[Ref-1]	ETSI, TS 102 034 V1.3.1 (2007-10), "Digital Video Broadcasting: Transport of MPEG-2 Based DVB Services over IP Based Networks"
[Ref-2]	ETSI, TS 102 539 V1.2.1 (2008-04), "Digital Video Broadcasting: Carriage of Broadband Content Guide (BCG) information over Internet Protocol"
[Ref-3]	Open IPTV Forum, "Open IPTV Forum, Functional Architecture – V1.1", January 2008.
[Ref-4]	Open IPTV Forum Solution Specification Volume 7 – Authentication, Content Protection and Service Protection.
[Ref-5]	Open IPTV Forum Solution Specification Volume 5 - Declarative Application Environment.
[Ref-6]	Open IPTV Forum Solution Specification Volume 2 - Audio-Video Media and Transport Formats
[Ref-7]	Open IPTV Forum Solution Specification Volume 4 - Protocol Specification.
[Ref-8]	Open IPTV Forum Solution Specification Volume 6 - Procedural Application Environment.
[Ref-9]	DVB, Blue Book A107, "Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.2"
[Ref-10]	ETSI, TS 300 468 v1.8.1 (2007-10), "Digital Video Broadcasting: Specification for Service Information (SI) in DVB systems"
[Ref-11]	ETSI, TS 102 822-3-1 V1.4.1 (2007-11), "Broadcast and On-line Services: Search, select and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 - Metadata schemas"
[Ref-12]	ETSI, TS 102 822-3-2 V1.4.1 (2007-11), "Broadcast and On-line Services: Search, select and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 2: System aspects in a uni-directional environment"
[Ref-13]	ETSI, TS 102 822-6-1 V1.4.1 (2007-11), "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 6: Delivery of metadata over a bi-directional network; Sub-part 1: Service and transport"
[Ref-14]	IETF, RFC 2119 (1997-03), IETF, "Key words for use in RFCs to Indicate Requirement Levels"
[Ref-15]	DVB, http://www.dvb.org/products_registration/dvb_identifiers/
[Ref-16]	ETSI, TS 102 323 V1.2.1 (2005-11) "Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams
[Ref-17]	IEC, "Internet protocol (IP) and transport stream (TS) based service access", IEC 62455, June 2007
[Ref-18]	ETSI, TS 102472 V1.2.1 (2006-12), "Digital Video Broadcasting (DVB); IP Datacast over DVB-H: Content Delivery Protocols

2 Conventions and Terminologies

2.1 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [Ref-14] .

2.2 Abbreviations

Abbreviation	Definition
AV	Audio/Video
BCG	Broadband Content Guide
CEHTML	Consumer Equipment HTML
CoD	Content on Demand
CRID	Content Reference Identifier
DAE	Declarative Application Environment
DVBSTP	DVB SD&S Transport Protocol
EIT	Event Information Table
EIT P/F	EIT Present/Following
EPG	Electronic Program Guide
HTTP	Hypertext Transfer Protocol
IG	IMS Gateway
IMI	Instance Metadata Identifier
OITF	Open IPTV Terminal Function
SD&S	Service Discovery and Selection
SDP	Session Description Protocol
SDT	Service Description Table
SOAP	Simple Object Access Protocol
TS	Transport Stream
URI	Uniform Resource Identifier
URL	Uniform Resource Location
XML	eXtensible Markup Language
XSD	XML Schema Description

2.3 Definitions

2.3.1 Metadata

This clause describes the metadata associated with various Open IPTV Forum services.

- **Linear TV metadata**
  Metadata that is associated with the content items provided in the Scheduled Content Service. In the Scheduled Content Service the content playout time is determined by the service provider.

- **CoD metadata**
  Metadata describing the attributes of content items available to the user on an on-demand nature. The CoD Metadata is typically organised as a catalog which may be presented in different perspectives such as alphabetical listing or grouped by genre.

- **Interactive Services metadata**
  Metadata describing interactive applications that may be available to the user.

- **Stored Content metadata**
  Metadata describing scheduled content items that have been recorded by the user and are available for playback either from network storage or local storage.

2.3.2 Metadata Formats

The Open IPTV Forum metadata is based on two ETSI Standard specifications:

- **Service Discovery and Selection (SD&S)**

  SD&S Metadata is a set of data related to the Service Discovery and Selection (SD&S) mechanism as defined by ETSI [Ref-1] . This metadata allows the OITF to retrieve information to select Linear TV services (i.e. multicast address, channel name, package …), BCG services (for linear TV or CoD) or other DVB services.

- **Broadband Content Guide (BCG)**

  The BCG is a set of data related to the description of Linear TV events and services, and/or CoD content as defined by ETSI [Ref-2] .

3 Metadata Content

This clause defines the Open IPTV Forum extensions to the SD&S and BCG schemas and the AV classification schemes. Please refer to the SD&S [Ref-1] and BCG [Ref-2] specifications for the base schemas.

3.1 Schema Extension and Validation

Open IPTV Forum metadata is in the form of instance document which is validated against a schema defined in the present document. The Open IPTV Forum XML schema is obtained by extending SD&S [Ref-1] and BCG [Ref-2] schemas.

3.1.1 Metadata Extensibility

The present document provides schema descriptions of those elements and attributes that are extended from original schema defined in [Ref-1] for SD&S or [Ref-2] for BCG. The extension rule adopted in the present document follows the "forward compatibility" constraints specified for extending BCG Schema [Ref-12]

3.1.2 Metadata Validation

No specific XSD validation tool is mentioned in [Ref-1] for SD&S or [Ref-2] for BCG. Content that is purported to conform to the extension specified in the present document must pass a validation test using any widely-accepted XSD validation engine. In cases where the narrative description of the present document conflicts with the extended schema, the narrative will be considered authoritative. A companion schema (.xsd) documents associated with the present document provides the consolidated XML schema definition of SD&S and BCG metadata extended as the Open IPTV Forum metadata.

3.2 SD&S (Service Discovery and Selection) Extensions

This clause describes the Open IPTV Forum extensions to the SD&S schema described in [Ref-1] . SD&S records provide an XML-based description of Service Providers and their Services. They enable OITFs to discover and select appropriate services. However within Open IPTV Forum it is also possible to discover these via web-based applications. Therefore these Open IPTV Forum extensions provide a means to signal web-based applications from within SD&S records. There are also Open IPTV Forum extensions provided for Bandwidth re-negotiation and purchasing a Broadcast Service.

All schema extensions are described in ANNEX B. For details of the original SD&S schema, please see [Ref-1] .

3.2.1 Service Provider Discovery Extensions

Service Provider Discovery information contains information about Service Providers including references to the Service offerings they provide [Ref-1] . Further details of the Service Provider XML schema can be found in clause 5.2.5 of [Ref-1] .

The main difference between the SD&S [Ref-1] and Open IPTV Forum service discovery mechanisms is that the former is described through an XML document, whereas the latter MAY be expressed through CE-HTML. That is, the DAE makes it possible for an OITF to receive the service discovery information and a service provider's specific applications as a CE-HTML document. Service Provider Discovery information MAY also provide addresses of DAE-based IPTV service discovery entities [Ref-3] , requiring the existing Service Provider discovery's XML schema to be extended.

This clause extends the Service Provider Discovery record to announce DAE applications at the IPTV Service Provider level, such as a Service Provider's portal, through SD&S. Two approaches are specified within Open IPTV Forum (see Figure 1):

-   Use of a WebOffering URI to indicate the DAE application location for Service Discovery information
-   Use of the ApplicationList extension [Ref-9]

Both extensions are combined in the schema in ANNEX B. For clarity of discussion, these extensions are separated in the following two sub-clauses.
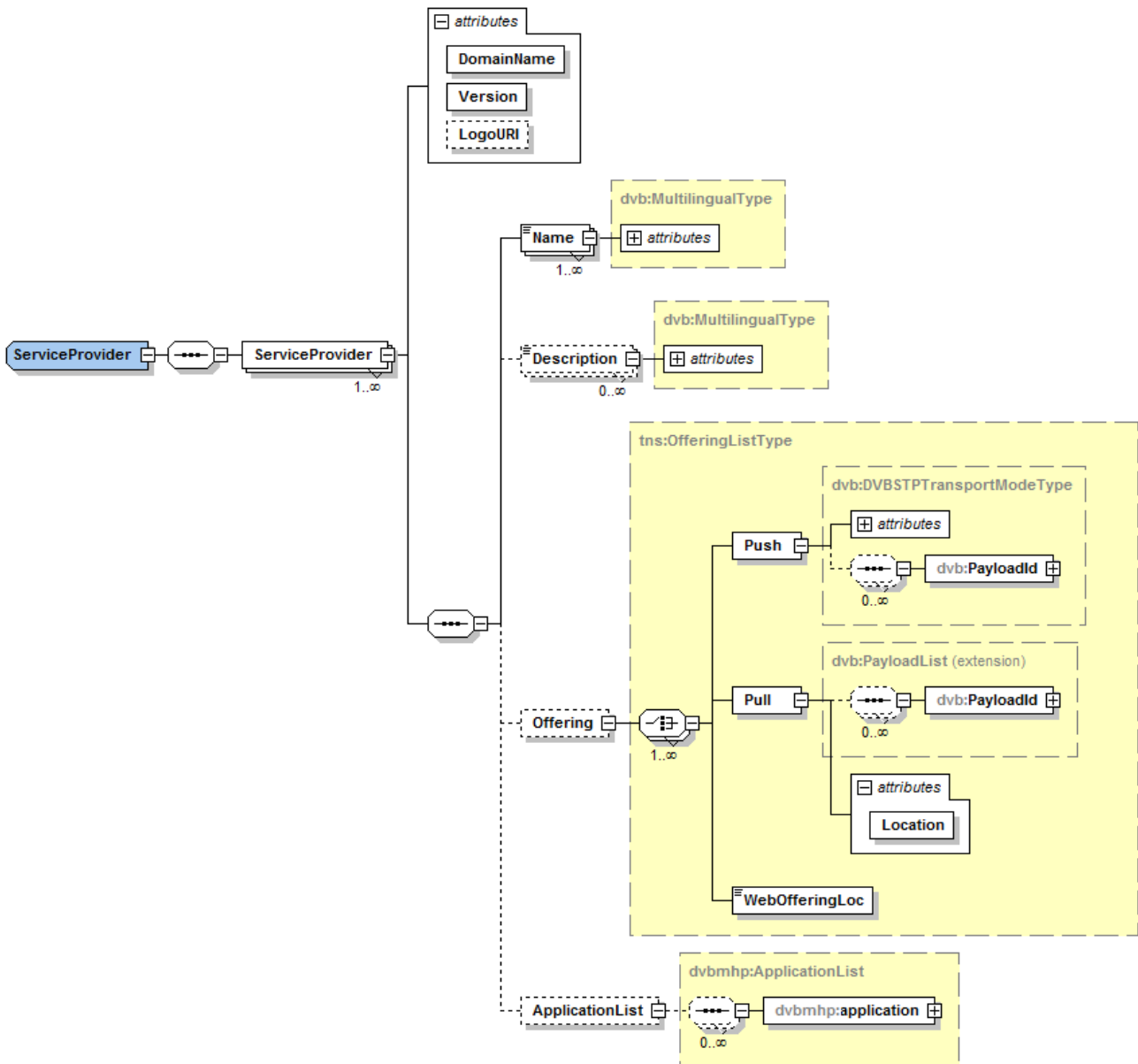
Figure 1: Outline of Service Provider Record updates

3.2.1.1 WebOffering URI

The announcement of applications to be started when a service provider is selected MAY be supported at the location in SD&S shown in Table 1. For application signalled using this approach, the WebOfferingLoc element in Table 1 SHALL be used to signal CEHTML applications. Refer to Annex B.6 for the schema extension.

The other elements which are not described in Table 1 SHALL conform to clause 5.2.5 of [Ref-1] .

Table 1 Extract of Service Provider(s) Discovery Record Indicating WebOffering Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
OfferingListType type(one entry per offering):	*/ServiceDiscovery/ServiceProviderDiscovery/ServiceProvider/Offering*	
Push	*Existing element. Refer to table 2 of section 5.2.5 of [Ref-1] .*	*O*

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
Pull	*Existing element. Refer to table 2 of section 5.2.5 of [Ref-1] .*	*O*
WebOfferingLoc	This URI indicates the location of the Open IPTV Forum Service Discovery information for a certain Service Provider. With the given URI address, OITF can access service discovery information not in the form of XML document, but in the form of CE-HTML document. That is, the WebOfferingLoc element is an entry point of service discovery information for DAE application.	O

3.2.1.2 ApplicationList

The announcement of applications to be started when a service provider is selected MAY be signaled through the ApplicationList extension defined in [Ref-9] at the location in SD&S shown in Table 2. Refer to Annex B.5 for the schema extension.

For applications signalled using this approach, the WebApplicationDescriptor (see Annex B.11) SHALL be used to signal CE-HTML applications in ApplicationSpecificDescriptor element (see clause AR.3.15 of [Ref-9]).

The other elements which are not described in Table 2 SHALL conform to clause 5.2.5 of SD&S [Ref-1] .

Table 2: Extract of Service Provider Discovery Record Indicating ApplicationList Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
ServiceProvider type (one entry per Service Provider):	*/ServiceDiscovery/ServiceProviderDiscovery/ServiceProvider/*	
ApplicationList	Application List extension for signalling Applications	O

The above ApplicationList signalling provides announcement of applications that are not bound to a particular service. Applications which are part of one or more linear TV services can also be announced using ApplicationLists that may be placed in the SD&S Package or the SD&S IPService entry (See clauses **Error! Reference source not found.** and **Error! Reference source not found.** of this specification).

3.2.2 Service Discovery Extensions

Service Discovery records provide descriptive information about and access details to the services (e.g. service name, service URL, etc.) offered by a service provider, for example, linear TV broadcasts or BCG(s).

Four types of extension are defined by the Open IPTV Forum:

- Application signalling

- Bandwidth renegotiation

- Purchasing broadcast services

- Indicating Container Format

Signalling of DAE applications (e.g. an XHTML Content Guide or Chat Application) in the SD&S Service Discovery information can be done in one of two ways:

- Using ApplicationList in Package and/or IPService extensions;

- Using the Content Guide Discovery Record and/or Communication Discovery Record.

3.2.2.1 Application Signalling using ApplicationList

Applications MAY be signalled using the following extensions:

3.2.2.1.1 Package Discovery Record Extension

The Package Discovery Record provides a means for a collection of services to be signalled or grouped as a single entity. For the detailed information, please refer to section 5.2.6.5 of SD&S [Ref-1] .

DAE Applications which are to be announced as part of a package of linear TV services through SD&S MAY be signalled through the ApplicationList Package extension defined in MHP [Ref-9] . Such applications run while a service from that package is being presented by the OITF. For applications signalled using this approach, the WebApplicationDescriptor (see Annex B.11) SHALL be used to signal CEHTML applications.

See Annex B.9 for the Package schema extension and Annex AR of MHP [Ref-9] for details of the schema extension.

3.2.2.1.2 IPService Extension

IPService provides information about a broadcast IP service, e.g. a linear TV service, offered by a service provider. It gives information about the service's identifier and the location at which it may be found (e.g. an RTSP address). IPService SHALL conform to 5.2.6.2 of SD&S and MAY include the following extension.

DAE applications which are to be announced as part of a linear TV service through SD&S MAY be signalled through the ApplicationList IPService extension defined in MHP [Ref-9] . Such applications run while that service is being presented by the OITF. For applications signalled using this approach, the WebApplicationDescriptor (see Annex B.11) SHALL be used to signal CEHTML applications.

See ANNEX B for the IPService schema extension and Annex AR of MHP [Ref-9] for details of the relevant schema extension defined by DVB.

3.2.2.2   Application Signalling using the BCG Record extension and/or Communication Discovery Record

Applications MAY be signaled using the following extensions:

3.2.2.2.1   Content Guide Discovery Record

The ContentGuide Discovery Record provides a means to discover Content Guides listing the content that is available for the live, content on demand, or downloadable contents. As described in the Open IPTV Forum architecture, Content Guide information can be delivered as a XML document or a Web page [Ref-3] . Some service providers may want to deliver the guide information via XML document; however, the other service providers may want to deliver the guide information via XHTML document.

 For further details, please refer to section 5.2.6.6 of SD&S [Ref-1] For the detailed schema information refer to ANNEX B. The other elements which are not described in the below table SHALL be conform to 5.2.6.6 of SD&S [Ref-1] . For applications signalled using this approach, the ContentGuideLoc element in Table 3 SHALL be used to signal CE-HTML applications. This record requires new payload Id to deliver this information which is defined in section 4.1.1.1.

Note: If a service provider wants to deliver BCG metadata[Ref-2] with the extended BCG elements, defined in 3.3 of this document, via DVBSTP, HTTP, or SOAP, the service provider MAY use this Guide Discovery Record. However, the BCGOffering Record, defined in 5.2.6.6. of SD&S [Ref-1] , MAY be used to deliver BCG metadata defined in [Ref-2]

Table 3 ContentGuide discovery record

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
ContentGuideOffering type	/ContentGuideDiscovery/	
....		
TransportMode	/ContentGuideDiscovery/BCG/TransportMode The location where the broadband content guide may be found.	M
DVBSTP	Refer to table 9 of section 5.2.6.6 of [Ref-1] .	O
HTTP@Location	Refer to table 2 of section 5.2.6.6 of [Ref-1] .	M (if the http element is used)
HTTP@SOAP	Refer to table 2 of section 5.2.6.6 of [Ref-1]	O
ContentGuideLoc	This URI indicates the content guide location for broadcasting services, content on demand services, downloadable content guide, or etc. With the given URI address, OITF receives guide information not in the form of XML document, but in the form of XHTML document. That is, the ContentGuideLoc element is a Content Guide URI for DAE application. Note: Unlike DVBSTP and HTTP elements, this element SHALL NOT be used more than once if this element needs to be used.	O
....		
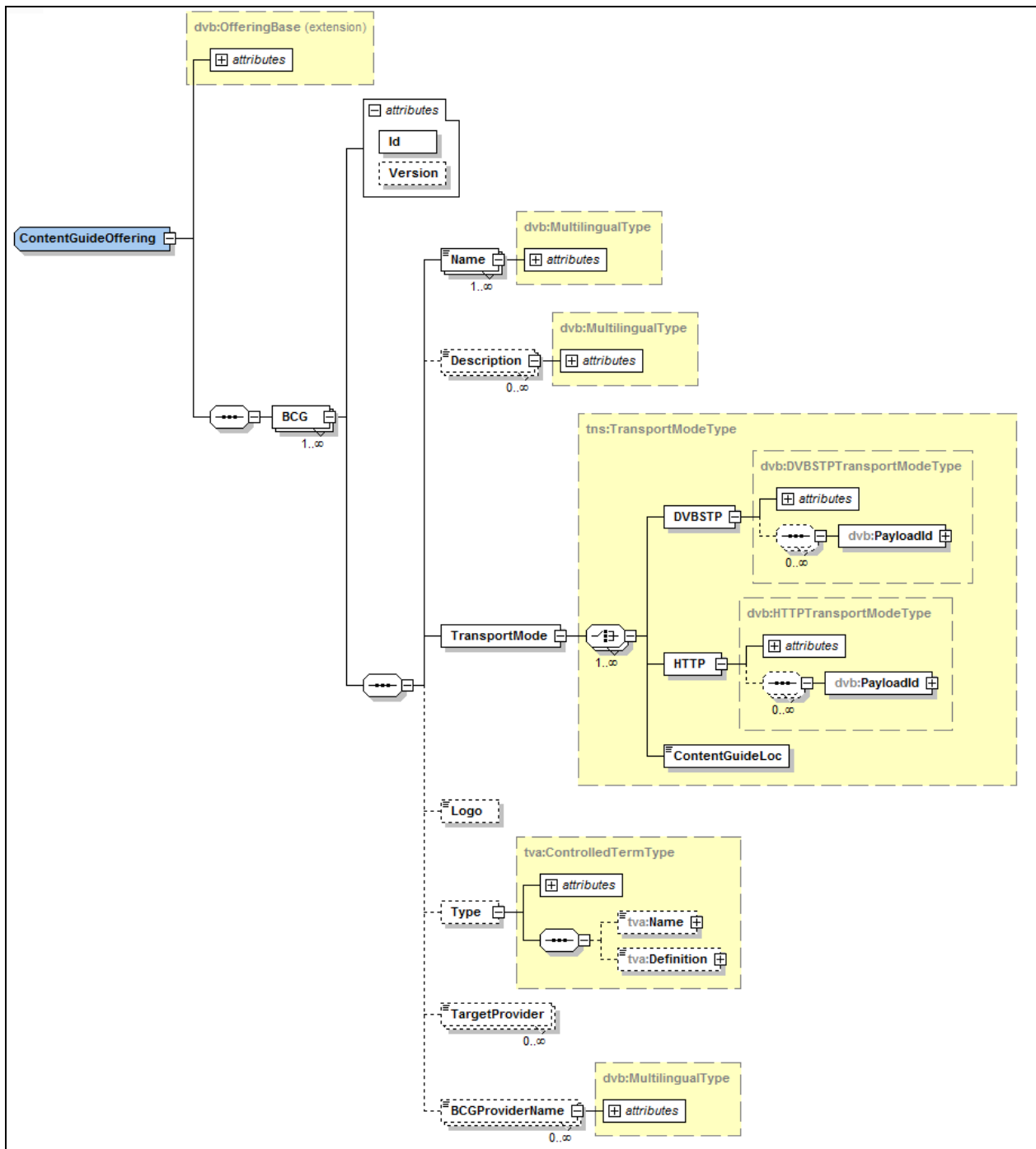
3.2.2.2.2   Communication Discovery Record

In order to realize communication services, the OITF needs to have applications for Chat, Instant Message, Presence, Caller-ID, etc. The Communication discovery record MAY be used to access or download DAE Applications for enabling Communication services. This record requires new payload Id to deliver this information which is defined in section 4.1.1.1. For application signalled using this approach, InitialAppLoc element in **Error! Reference source not found.** SHALL be used to signal CE-HTML applications.

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Table 4 Communication discovery record

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
CommunicationOffering type:	/CommunicationDiscovery	
InitialAppLoc	Indicates an URI of DAE Application for Communication services. If this record is used to deliver Communication application, this element SHALL be used once and SHALL have URI information of the initial entry page of Communication application. That is, this element SHALL take OITF into the initial page of Communication service application.	M

3.2.2.3 Bandwidth Renegotiation

The IPService Record of SD&S [Ref-1] is extended to

- make the MaxBitrate element mandatory in case of managed network.

- and include an optional TimeToRenegotiate element that when present is used to determine when down-sizing of the reserved bandwidth for the content session is performed.

See Annex B.10 for the IPService schema extension.

Table 5 Extract of Broadcast Discovery Record Indicating MaxBitrate Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
BroadcastOffering type:	/BroadcastDiscovery	
IPService type (one entry per service):	/BroadcastDiscovery/ServiceList/SingleService	
MaxBitrate	Specifies the maximum bitrate of the overall stream carrying the service.	M (For managed Network only)

The MaxBitrate is used during session initiation or session modification for scheduled services to ensure that the necessary bandwidth is available in the network.

Table 6 Extract of Broadcast Discovery Record Indicating TimeToRenegotiate Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
BroadcastOffering type:	/BroadcastDiscovery	
IPService type (one entry per service):	/BroadcastDiscovery/ServiceList/SingleService	
TimeToRenegotiate	This element provides a duration in seconds to be used in conjunction with MaxBitrate to determine when renegotiation of network bandwidth is to occur.	O

Each service is represented by an IPService structure in the Broadcast Discovery Record. When the service is changed, typically through a user initiated channel change request, the TimeToRenegotiate value will be used in conjunction with the MaxBitrate to determine how bandwidth re-negotiation will be performed.

Note that at every channel change if there is a pending timeout for session modification due to a previous service change then it is cancelled. The OITF may initiate a new session modification as described below.

When the TimeToRenegotiate element is provided with the IPService record then

- The MaxBitrate element SHALL be provided.

- If the MaxBitrate of the new service is greater than the reserved bandwidth, network bandwidth reservation using the MaxBitrate of the new service SHALL occur immediately to ensure sufficient bandwidth is made available for the new service.

- If the MaxBitrate of the new service is equal to the reserved bandwidth, network bandwidth reservation procedures SHALL NOT be performed as sufficient bandwidth is already available for the new service.

- If the MaxBitrate of the new service is less than the reserved bandwidth, network bandwidth reservation using the MaxBitrate of the new service SHALL occur after the period (in seconds) provided by the TimeToRenegotiate element of the new service.

3.2.2.4 Purchasing Broadcast Services

The IPService Record of SD&S[Ref-1] is extended to include an optional PurchaseItem element. The PurchaseItem element allows conditions to be placed on the availability of purchased content,

See Annex B.10 for the IPService schema extension.

Table 7 Extract of Broadcast Discovery Record Indicating PurchaseItem Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
BroadcastOffering type:	*/BroadcastDiscovery*	
IPService type (one entry per service):	*/BroadcastDiscovery/ServiceList/SingleService*	
PurchaseItem	This element provides a means to purchase a service. This element has extended with the tva:PurchaseItemType in order to include DRM control information.	O

For further details about PurchaseItem type, refer to section 3.3.2 of this document.

3.2.2.5 Container Format Indication

The IPService Record of SD&S [Ref-1] is extended to include an optional FileFormat element as defined in "AVAttributesType" defined in clause 6.3.5 of TV-Anytime specification [Ref-11] This element provides a means to indicate file format.

See Annex B.10 for the IPService schema extension.

Table 8 Extract of Broadcast Discovery Record Indicating FileFormat Extension

Element / Attribute Name	Element / Attribute Description	Mandated/ Optional
BroadcastOffering type:	*/BroadcastDiscovery*	
IPService type (one entry per service):	*/BroadcastDiscovery/ServiceList/SingleService*	
FileFormat	This element provides a means to indicate file format.	O

3.3 BCG (Broadband Content guide) Extensions

BCG metadata instance SHALL conform to the profile of options that are either mandatory, optional or not used, as defined in BCG [Ref-2] . This section describes extended elements and classification scheme to be applied for Open IPTV Forum services. It provides descriptions, structural diagrams and semantics definitions of elements and attributes that extend their original BCG counterparts. The Open IPTV Forum extended XML schema is defined in the ANNEX C and Open IPTV Forum classification scheme definitions are defined in ANNEX D.

3.3.1 Signalling and Media Transport Protocol Extension

3.3.1.1 OnDemandProgramType Extension

Content on Demand can be delivered in Open IPTV Forum using a combination of different signalling and media transport protocols. Information about the protocols used MAY be signalled in the OnDemandProgramType using the following extension.

Table 9 Extract of OnDemandProgram Type Indicating Protocol Type Extension

Element / Attribute Name	Element / Attribute Description
OnDemandProgramType	*A complex type derived from ProgramLocationType used to describe instances that can be acquired on demand (as opposed to broadcast).*
Protocol	An element specifying the protocol for content item delivery. This element refers to the term defined in Protocol Classification Scheme, defined in Annex.D.4

Extended OnDemandProgramType, defined in Annex.C.5, has the following structure:
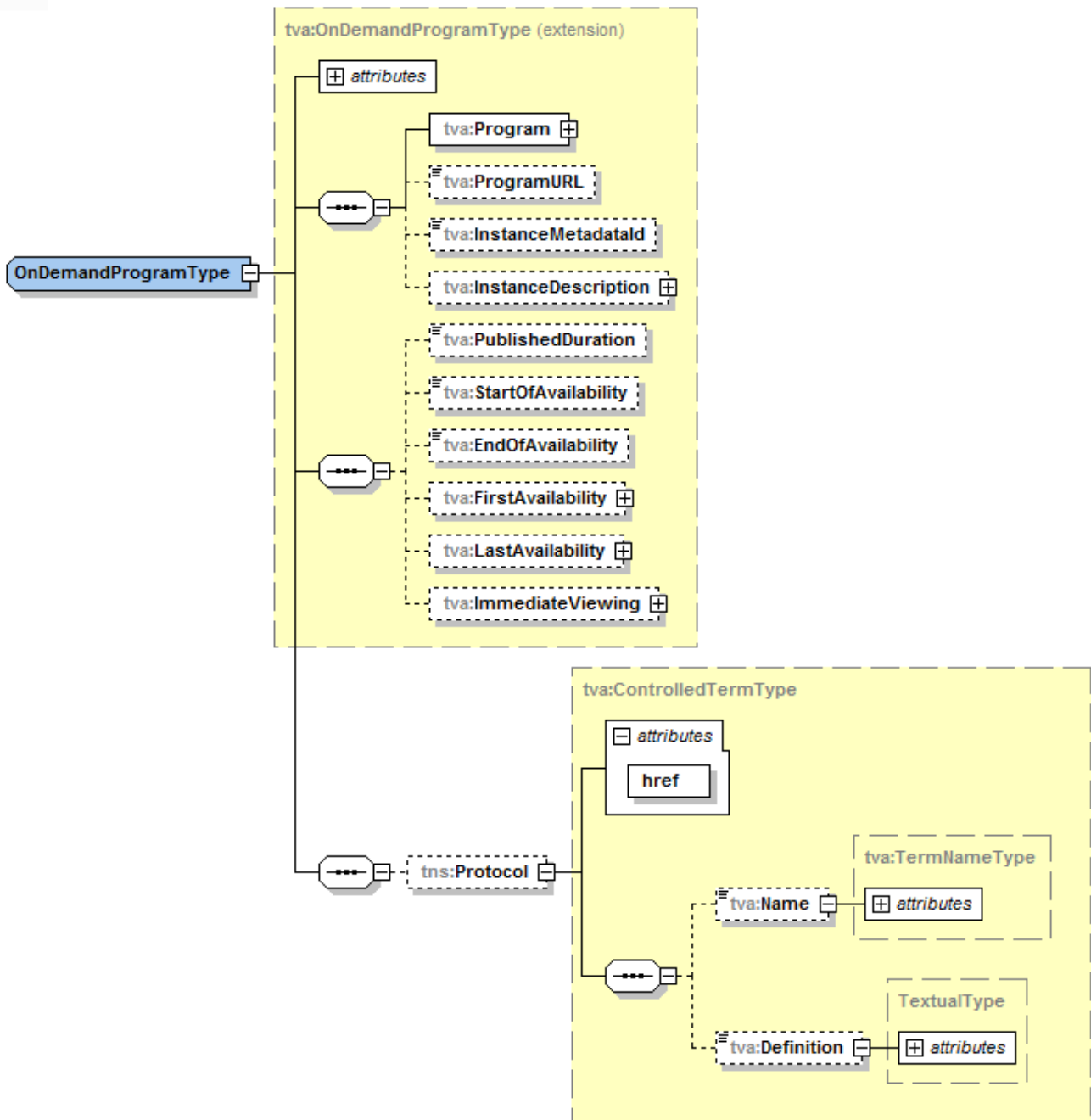
Figure 2 - OnDemandProgramType Extension for the protocol element

3.3.2 DRM Control Information Extension

3.3.2.1 PurchaseItemType Extension

The BCG is extended to hold the elements used as DRM control parameters. The PurchaseItemType as defined in clause 6.3.4 of TV-Anytime specification [Ref-11] is extended by the following DRMControlInformation schema to signal those parameters. The usage of those parameters is described in CSP [Ref-4] .

The existing DRMDeclaration element in the BCG SHALL NOT be used in Open IPTV Forum services.

Table 10 DRMControlInformation Type Semantics

Element / Attribute Name	Element / Attribute Description
DRMControlInformation	
DRMSystemID	URN with the DVB CA System ID (16 bit number) in there. Allocations of the value of this field are found in [Ref-15] . DRMSystemID shall be signalled by prefixing the decimal number format of CA_System_ID with "urn:dvb:casystemid:". For example, hexadecimal 0x4AF4 is assigned as CA_System_ID for "Marlin" by DVB, "Marlin" DRMSystemID is encoded as "urn:dvb:casystemid:19188". Note that the decimal number format of CA_System_ID SHALL not have leading zeroes.
DRMContentID	DRM Content ID for CoD or scheduled content item, e.g. the marlin Content ID
RightsIssuerURL	A URL used by OITF to obtain rights for this content item
SilentRightsURL	A URL used by OITF to obtain rights silently, e.g. a Marlin Action Token.
PreviewRightsURL	A URL used by OITF to obtain rights silently for preview of this content item, e.g. a Marlin Action Token.
DoNotRecord	A flag indicates this content item is recordable or not
DoNotTimeShift	A flag indicates this content item is allowed for time shift play back.
DRMGenericData	Placeholder for generic data that is applicable to all DRM schemes to be applied for this content item.
DRMPrivateData	Private data for the DRM scheme indicated in DRMSystemID to be applied for this content item. This structure can be substituted by DRM system specific structure.

The Extended PurchaseItemType, defined in Annex. C.4, has the following structure.
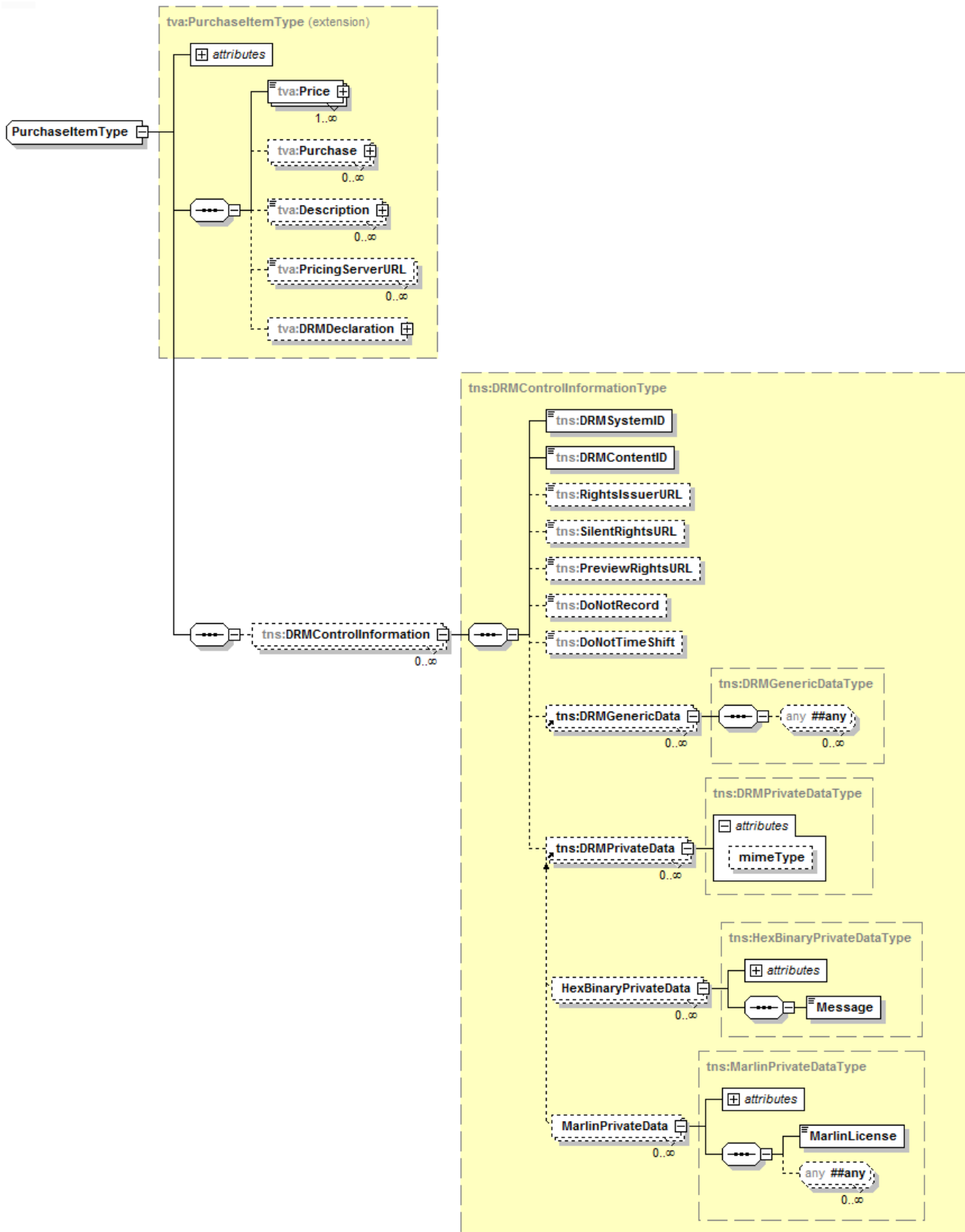
Figure 3 - PurchaseItemType Extension for the DRMControlInformation

3.3.3 Open IPTV Forum Classification Schemes

The following classification schemes wholly replace the BCG equivalent classification schemes. .

3.3.3.1 VideoCodingFormat Classification Scheme

The element "coding" in "VideoAttributesType" defined in clause 6.3.5 of TV-Anytime specification [Ref-11] shall refer to the terms listed in VisualCodingFormatCS (Annex D.1) of the present document.

3.3.3.2 AudioCodingFormat Classification Scheme

The element "coding" in "AudioAttributesType" defined in clause 6.3.5 of TV-Anytime specification [Ref-11] shall refer to the terms listed in AudioCodingFormatCS (Annex D.2) of the present document.

3.3.3.3 AVMediaFormat Classification Scheme

The element "FileFormat" in "AVAttributesType" defined in clause 6.3.5 of TV-Anytime specification [Ref-11] shall refer to the terms listed in AVMediaFormatCS (Annex D.3) of the present document.

3.3.3.4 Protocol Classification Scheme

The element "Protocol" in "OnDemandProgramType" defined in clause 3.3.1 of the present document shall refer to the terms listed in ProtocolCS (Annex D.4).

3.3.3.5 Reference to Parental Guidance Classification Scheme

The element "ParentalGuidance" in "BasicContentDescriptionType" defined in TV-Anytime specification [Ref-11] clause 6.3.4 shall refer to the terms referred by the description for "ParentalGuidance" and also the terms listed in GermanyFSKCS (Annex D.5).

4 Metadata Control and Delivery

This clause explains how to deliver metadata to the client and how the client may handle it, including how to manage metadata updates.

4.1 Metadata Delivery Mechanism

This clause explains how SD&S and BCG XML metadata is carried over the network.

Delivery of SD&S and BCG metadata SHALL be as described in the respective SD&S [Ref-1] and BCG [Ref-2] specifications, with the following extensions.

4.1.1 Carriage of SD&S metadata

This clause specifies the protocols that are used to deliver SD&S metadata information for multicast and unicast. For the delivery over multicast, the DVBSTP protocol SHALL be used as defined in clause 5.4.1 of SD&S [Ref-1] . For unicast delivery, the HTTP protocol SHALL be used as defined in clause 5.4.2 of SD&S [Ref-1] .

4.1.1.1 Additional PayloadID Values

To signal the ContentGuideDiscovery Record and CommunicationDiscovery Record in SD&S, additional PayloadID values are REQUIRED in addition to those specified in clause 5.2.2.1 of SD&S [Ref-1] . All other PayloadIDs SHALL be as specified in clause 5.2.2.1 of SD&S [Ref-1] and clause 4.1.2.1 of BCG [Ref-2] .

Note: This clause only applies when Metadata Content is transported with DVBSTP and HTTP.

Note: In the OfferingListType of the Service Provider Discovery record, the list of payload Ids, segment Ids, and version number is mandatory when SD&S information is provided with HTTP request. This list is optional when SD&S information is delivered with DVBSTP because the list of payload Ids, segment Ids, and version number can be found in the DVBSTP header [Ref-1] .

Table 11 Payload ID values

Metadata Type	Payload ID value	Description
Open IPTV Forum SD&S	0xF1	ContentGuide Discovery Information
	0xF2	Communication Discovery Information
	0xF3 to 0xFF	User Private
	Others	Reserved

4.1.1.2 Encoding SD&S metadata

Encoding SD&S metadata MAY be supported as described in clause 5.5 of SD&S [Ref-1] .

4.1.1.3 Update mechanism for SD&S

The Update mechanism SHALL be supported as described in clause 5.4.3 of SD&S [Ref-1]

4.1.2 Carriage of BCG metadata

BCG metadata has two different transport means to carry BCG metadata: Container Based delivery, and Text Based delivery based on Query mechanism.

Container based delivery of BCG metadata SHALL conform to clause 4.1 of [Ref-2] .

The OITF MAY support the SOAP Query mechanism for text-based delivery.

4.1.2.1 Container Based Delivery

This clause specifies the protocols that are used to deliver BCG metadata information for multicast and unicast. For the delivery over the multicast, the DVBSTP protocol SHALL be used as defined in clause 4.1.2.2.1 of BCG [Ref-2] . For unicast delivery, the HTTP protocol SHALL be used as defined in clause 4.1.2.2.2 of BCG [Ref-2] .

4.1.2.1.1 Encoding BCG metadata

Encoding BCG metadata MAY be supported as described in BCG [Ref-2] . BCG metadata can also be delivered without encoding.

4.1.2.1.2 Update mechanism for BCG

The lifecycle of delivered metadata is managed through a fragment updating method. The instance is identified through individual fragment id and its versioning is managed by fragment version. The details of update management and the unit of fragment are described in TV-Anytime specification [Ref-12] . OITF client is able to detect the changes of fragment version through the method described in clause 5.4.3 of SD&S [Ref-1] .

4.1.2.2 SOAP Query Mechanism

The query mechanism for metadata acquisition is described in this clause. It SHALL be implemented according to clause 4.2 of BCG [Ref-2] .

As indicated in Table 4 of BCG [Ref-2] , the mandatory SOAP methods (described in TV-Anytime specification [Ref-13] SHALL be:

Table 12 Methods of SOAP

	Service Provider	HNED
get_Data	M	M
describe_Get_Data	M	M

The following clauses outline each of these methods. The TV-Anytime specification [Ref-13] should be referred to for more detailed guidelines.

In all examples the SOAP and HTTP wrappers are omitted for clarity.

4.1.2.2.1 get_Data

The get_Data method allows a client to query a server in order to retrieve BCG data for a set of programmes or programme groups. The flexibility of the query syntax enables simple or complex queries to best restrict the set and size of the metadata response. For example, a simple query could request program information for a specific content identifier or program title. Alternatively, more powerful queries can be generated by combining these simple queries, for example, to create an EPG a request can be made for all program and schedule information across a range of services between specific dates. Content resolution can also be performed using the same method to retrieve content referencing information for one or more content identifiers.

Optional parameters are available to limit the number of results (e.g. 10 results) and to sort them (e.g., sort alphabetically by title). Support for these features is optional on the server and indicated to the client in a describe_Get_Data response (see Example 4 in clause 4.1.2.2.2).

The query mechanism is fully defined in clause 5.1 of TV-Anytime specification [Ref-13] , with many examples of potential requests given in Annex C of TV-Anytime specification [Ref-13] .

The following is an example client get_Data request for the program information of all programs with a title equal to "News":

```
<get_Data xmlns="urn:tva:transport:2007" ...>
  <QueryConstraints>
    <BinaryPredicate fieldID="tvaf:Title" fieldValue="News"/>
  </QueryConstraints>

  <RequestedTables>
    <Table type="ProgramInformationTable"/>
  </RequestedTables>
</get_Data>
```

Example 1: Client get_Data request [Ref-13]

And the Server's response to this request:

```
<get_Data_Result serviceVersion="1" xmlns="urn:tva:transport:2007"...>
  <TVAMain>
    <ProgramDescription>
      <ProgramInformationTable>
        <ProgramInformation programId="CRID://www.broadcaster.com/News1">
          <BasicDescription>
            <Title>News</Title>
            <Genre href="urn:tva:metadata:cs:ContentCS:2007" type="main">
              <Name>News</Name>
            </Genre>
          </BasicDescription>
        </ProgramInformation>
        <ProgramInformation programId="CRID://www.broadcaster.com/News2">
          <BasicDescription>
            <Title>News</Title>
            <Genre href="urn:tva:metadata:cs:ContentCS:2007" type="main">
              <Name>News</Name>
            </Genre>
          </BasicDescription>
        </ProgramInformation>
      </ProgramInformationTable>
    </ProgramDescription>
  </TVAMain>
</get_Data_Result>
```

Example 2: Server response to get_Data request [Ref-13]

4.1.2.2.2 describe_Get_Data

The describe_Get_Data method provides a client with information concerning the server's capabilities in terms of get_Data requests. For example, it will specify the metadata tables available to be queried, possibly also listing the particular fields that can be searched or sorted on.

The following example is a request for the Server's get_Data capabilities:

```
<describe_Get_Data xmlns="urn:tva:transport:2007"/>
```

Example 3: Client describe_Get_Data request [Ref-13]

The response (shown below) provides a description of the BCG provider along with its capabilities, such as supported domains, table types, specific fields that can be queried and sorted, and for which Services it provides metadata:

```
<describe_get_Data_Result serviceVersion="1" xmlns="urn:tva:transport:2007"
xlmns:tva="urn:tva:metadata:2007" ulmns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Name>Metadata Service</Name>
  <Description>A Metadata Service</Description>
  <AuthorityList>
    <Authority>broadcaster.com</Authority>
  </AuthorityList>

  <AvailableTables xmlns:tvaf="urn:tva:transport:fieldIDs:2007">
    <Table xsi:type="ProgramInformationTable"
      canQuery="tvaf:CRID tvaf:Synopsis tvaf:KeyWord tvaf:Genre"/>

    <Table xsi:type="ServiceInformationTable"
      canQuery="tvaf:serviceID tvaf:Name tvaf:ServiceURL"/>

    <Table xsi:type="ProgramLocationTable"
      canQuery="tvaf:ServiceURL tvaf:PublishedTime"
      canSort="tvaf:ServiceURL tvaf:PublishedTime">
    <AvailableLocations>
      <Availability>P7D</Availability>
      <ServiceURL>dvb://2.7d1.13</ServiceURL>
      <ServiceURL>dvb://2.7d1.14</ServiceURL>
    </AvailableLocations>
    </Table>
  </AvailableTables>
</describe_get_Data_Result>
```

Example 4: Server's describe_Get_Data Response [Ref-13]

4.1.2.2.3 SOAP Update mechanism for BCG

The overall BCG XML document MAY have a version number associated with it. In addition, the BCG fragments MAY have an ID and version number associated with them, allowing the client to request fragment updates using the SOAP

Query mechanism [Ref-13] . Server support for fragment updates is indicated through the server's describe_Get_Data capabilities. See clause 5.1.2.4 of TV-Anytime [Ref-13] for further details.

4.1.3 Event Information Tables (EIT)

This section is related to the extension of TS Optional SI profile with EIT p/f (without SDT). The scope of this section is to allow an OITF to retrieve metadata embedded in a DVB Transport Stream.

A unicast mechanism for metadata retrieval can provoke server overload when a huge number of OITFs try to access the same information at the same time (i.e. request information for an event during zapping time). As EITs are synchronized with the content at TV head end level, EIT allows the OITF to have up-to-date information even if the content changes at the last minute or is longer than originally defined (e.g., prolongation in a football match) without any request to a server. The information contained in EIT can be used, for example, to show the title and duration of an item of content in a zapper application.

For IPTV services, if the OITF is able to use EIT embedded in a DVB Transport Stream, then the following section applies. This section is restricted to DVB world and is only applicable for MPEG-2 Transport Streams.

The EIT p/f contains metadata concerning events such as event name, start time, duration, etc. These metadata related to a piece of contents should be transported and synchronized directly into the transport stream using the EITs tables as describe in DVB-SI specification [Ref-10] .

For Open IPTV Forum, EIT information is restricted to the following two main types of table:

- actual TS, present/following event information = table_id = "0x4E";
- other TS, present/following event information = table_id = "0x4F";

The schedule informations table_id = "0x5F" and "0x6F" are not in the scope of this specification.

4.1.3.1 How to link EIT p/f with SD&S without SDT

As there is no SDT in the MPEG-2 TS optional SI profile the EIT p/f information is linked to the content using the "DVBTriplet" present in the SD&S information with the Original Network Id, TS Id, Service Id present in the EITs

Table 13 DVBTriplet ID Explanation

DVBTriplet@Original Network Id	Identifies the network Id of the originating delivery system	M
DVBTriplet@TS Id	Identifies the Transport Stream	M
DVBTriplet@Service Id	Identifies a service from any other service within the TS. The service Id is the same as the program number in the corresponding program map table.	M

4.1.3.2 How to optimize the transport of EIT p/f (Informative)

This section is an informative part that provides guidance in order to optimize the transport of EIT p/f actual/other tables over IP in MPEG-2 TS.

In this specification the usage of EIT p/f Actual TS and Other TS can be optimized to give the Open IPTV Forum user a better user experience. To achieve this goal, the cycle time of the EIT p/f actual TS can be reduced to 1s and a Service Provider may also choose to send more than one EIT p/f Actual table by SPTS.

Sending more than one EIT p/f Actuals tables allows the Service Provider to send a set of metadata related to some channels that are frequently used, at a quick cycle time (e.g. 1 or 2 second). For other channels that are less frequently viewed EIT p/f can be sent at a lower cycle time by using the EIT p/f other tables.

4.2 Metadata Control

This clause details how to link from SD&S metadata [Ref-1] to BCG [Ref-2] metadata, useful for creating EPGs (Electronic Program Guides). More detailed definitions and descriptions can be found in SD&S [Ref-1] , BCG [Ref-2] , and TV-Anytime specification [Ref-11] .

The SD&S metadata describes all services for each service provider such as broadcasting services, CoD services, BCG services, and so on. BCG metadata describes detailed information about pieces of content and services. If BCG service information is present, it SHALL take precedence over SD&S service information as described in clause 6.6 of BCG [Ref-2] .

In order to make an EPG, some elements of SD&S metadata information and BCG metadata information should be linked.

4.2.1 Locating a BCG for a Service using SD&S (informative)

Access to a BCG service is described in a BCG or ContentGuide Discovery Record, which is linked to from a Broadcast Discovery Record. To enable this, the following SD&S elements should be used:

➢ **Broadcast Discovery**

   – URI identifier of a BCG or ContentGuide Discovery record. Either:

■ *BroadcastDiscovery/SI/ServiceDescriptionLocation* or

■ *BroadcastDiscovery/ServicesDescriptionLocation*

In accordance with clause 5.2.6.2.2 of SD&S [Ref-1] , if present, SI/ServiceDescriptionLocation shall take precedence. Furthermore, if more than one BCG or ContentGuide Discovery record is specified, a single preferred record may optionally be signaled using the "preferred" attribute.

➢ **BCG and ContentGuide Discovery**

   – Identifier of BCG and ContentDiscovery Record

■ *BCGDiscovery/BCG@Id, or ContentGuideDiscovery/BCG@Id*

   – One of delivery information of BCG metadata

■ *BCGDiscovery/TransportMode/DVBSTP or ContentGuideDiscovery/TransportMode/DVBSTP*

■ *BCGDiscovery/TransportMode/HTTP@Location or ContentGuideDiscovery/TransportMode/HTTP@Location*

   • *BCGDiscovery/TransportMode/HTTP@SOAP or ContentGuideDiscovery/TransportMode/HTTP@SOAP*

Figure 4 - Indicates how to receive BCG metadata relating to a single service or a couple of services in Broadcast Discovery information. In order to signal BCG metadata for a single service or services' list, the value of "ServiceDescriptionLocation" or "ServicesDescriptionLocation" in Broadcast Discovery and "BCG@Id" in BCG or ContentGuide Discovery must be the same. The transport address of BCG metadata is described in the children nodes of "TransportMode" element in the relevant BCG or ContentGuide Discovery. With this address, the OITF can receive BCG metadata for a single service or a couple of services (either through push or pull container based mechanism, or through SOAP querying).
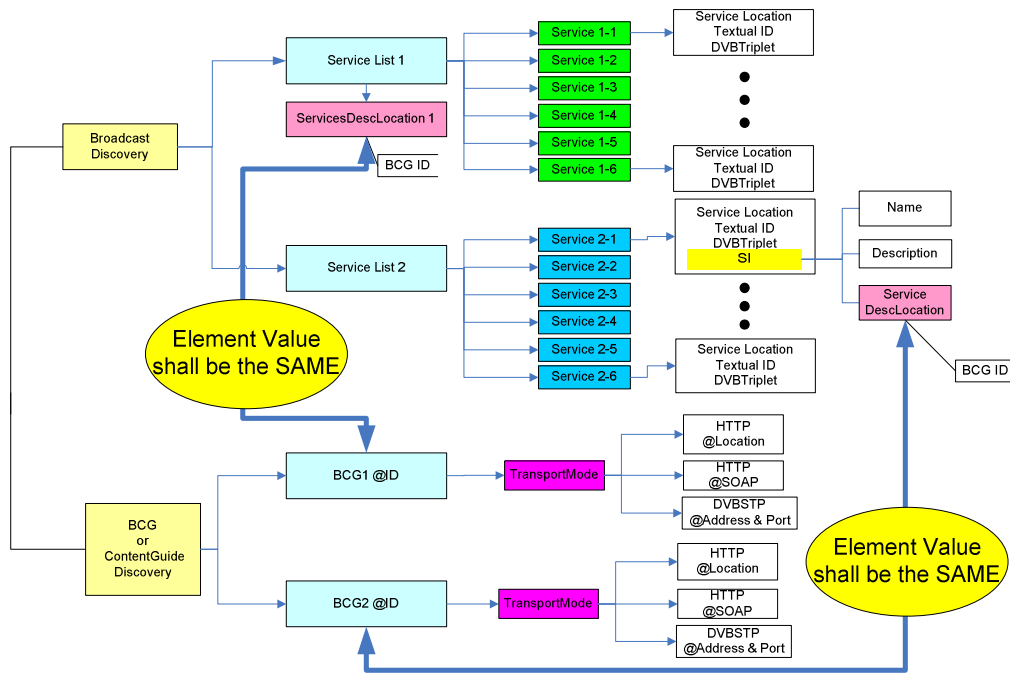
Figure 4 - How to link a service in Broadcast Discovery with BCG or ContentGuide Discovery

4.2.2 Linking SD&S Service Information with BCG (informative)

The BCG or ContentGuide Discovery record allows the OITF to receive all BCG metadata relating to a single service or a couple of services.

To create an EPG, for example, with the received BCG metadata and SD&S metadata, the following BCG metadata elements should be used:

➢ **ServiceInformationTable**
   – *TVAMain/ProgramDescription/ServiceInformationTable/ServiceInformation@serviceId*
      ■ Unique Identifier of Service whose syntax is defined in clause 5.2.1.2 of SD&S[Ref-1] - equals the ServiceName attribute in the associated SD&S Broadcast Discovery record (See clause 6.6 in BCG [Ref-2]).

➢ **Schedule Element in ProgramLocationTable**
   – *ProgramLocationTable/Schedule@serviceIDRef*
      ■ Reference of a serviceId
      ■ *serviceIDRef* value must be the same as the associated *serviceId in ServiceInformationTable*
   – *ProgramLocationTable/Schedule/ScheduleEvent/Program@crid*
      ■ CRID information of a program in a service. Provides link to detailed program description, found in the ProgramInformationTable.
   – *ProgramLocationTable/Schedule/ScheduleEvent/PublishedStartTime*
      ■ Advertised start time of a single program in a service
   – *ProgramLocationTable/Schedule/ScheduleEvent/PublishedDuration*
      ■ Advertised duration of a single program.

➢ **ProgramInformationTable**
   – *ProgramInformationTable/ProgramInformation@programId*
      ■ CRID value of a single program
      ■ *programId* value should be the same with one of CRID values in ProgramLocationTable

Figure 5 describes how to find description information in BCG from a single service of Broadcast Discovery. Service information in SD&S and BCG metadata is linked as described in clause 6.6 of BCG[Ref-2] (BCG

ServiceInformation@serviceId = SD&S BroadcastDiscovery ServiceName attribute). Once the *serviceId* value in *ServiceInformationTable* is found, a single service's schedule events can be retrieved from the *ProgramLocationTable*. Then, *Program@CRIDs* in *ScheduleEvent* values can be used to find detailed information of a single content by referencing *ProgramInformation@programId*.
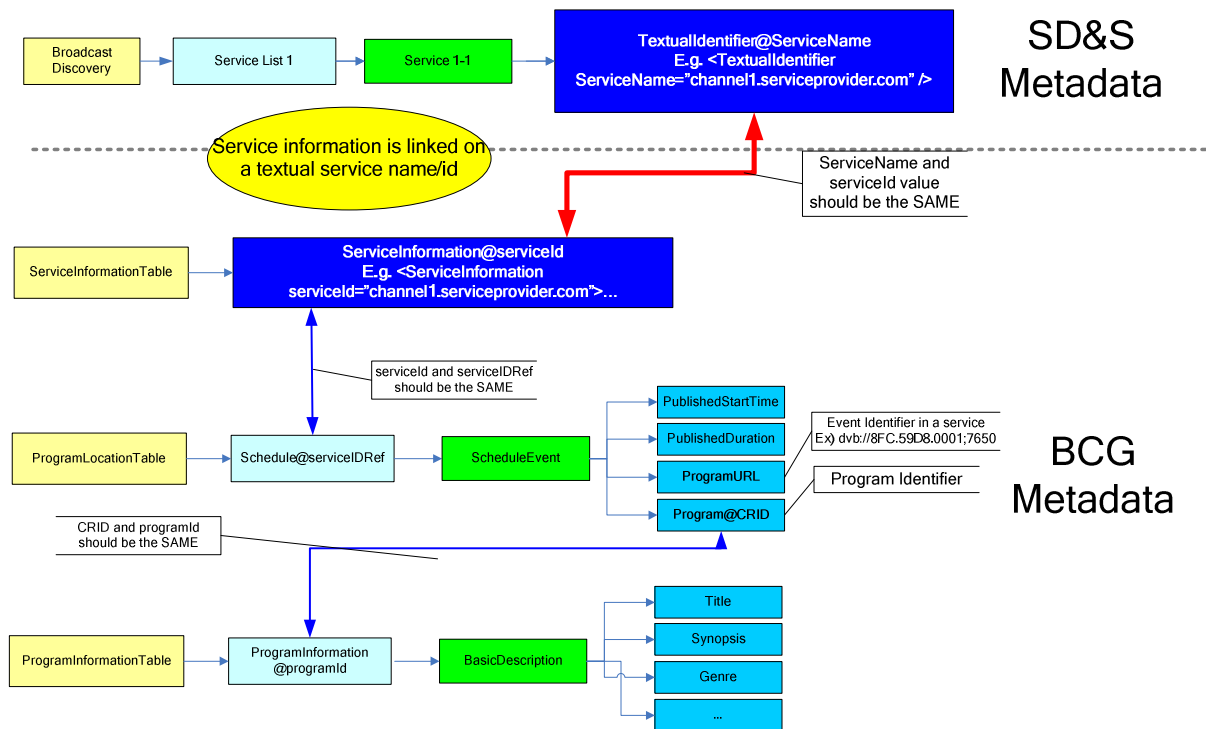

Figure 5 - How to Find Description Information in BCG from SD&S Metadata

In summary, an OITF can receive a single service, for example *canal-plus*, from SD&S's Broadcast Discovery record. With *BCG@Id* value in BCG Discovery, the OITF can collect BCG metadata which has all EPG information of ***canal-plus*** service. OITF compares serviceId values in *ServiceInformationTable* of BCG metadata in order to find a match with the same value of *canal-plus*'s *ServiceName attribute* of Broadcast Discovery record. Once OITF finds the same service from the *ServiceInformationTable*, OITF can find the *ScheduleEvents* of ***canal-plus***'s service, allowing the OITF to create the EPG's time table of a single channel. The detailed information of a single event can be described by *BasicDescription* using *ProgramInformation@programId* of *ProgramInformationTable*.

4.2.3 CRID Location Resolution

4.2.4.1 Unmanaged Networks

BCG CRID Location Resolution is the process of mapping a CRID to other CRIDs (e.g. for a series) or to a Locator (e.g. RTSP URL). A Locator provides accurate location and timing information for where and when to retrieve the content.

The terminal that supports BCG SHALL support content resolution:

- The terminal MAY support terminal-side resolution. If so, it SHALL be delivered using the container-based mechanisms, as specified by clause 5 of BCG [Ref-2] .

- The terminal SHALL support server-side resolution using the protocol defined in [Ref-13] .

A service provider MAY provide content resolution information.

4.2.4.2 Managed Networks

CRID Location Resolution for scheduled content is undefined.

For Content on Demand, the following applies:

The BCG provides two approaches to identifying each instance of content (e.g. HD and SD versions of Spiderman):

1) one CRID per instance (e.g. a "HD Spiderman CRID" and an "SD Spiderman CRID")

2) one CRID for the content (e.g. a "Spiderman CRID") and two IMIs for each instance (e.g. a "HD IMI" and an "SD IMI"); the combination of CRID and IMI identifies the appropriate instance.

It is a service provider decision as to which approach is used.

To enable either approach to be used for Content on Demand provided via managed networks, CoD session setup and initiation SHALL use the CRID and an Instance Metadata Identifier (where one exists) in conjunction with the process defined in clause 5.2.2 of the Protocol specification [Ref-7] .

This clause defines the format of the wild card portion of the "Request URI".

The wild card part (*) of the Request URI SHALL be constructed from the CoD's CRID and Instance Metadata Identifier (IMI), as signalled in the BCG, in accordance with the following format, as specified in clause 12.1.4 of [Ref-16]

<CRID>[#<IMI>]

As a CRID is composed of an <authority> and <data> section and an IMI is composed of a <name> and <data> section, the above construction can be represented in greater detail as:

<CRID_authority>/<CRID_data>[#[<IMI_name>/]<IMI_data>]

The "CRID://" and "imi:" portions of the respective identifiers SHALL be omitted.

The IMI portion of the Request URI is optional; however, if an IMI is signalled in the BCG for a CoD instance, it SHALL be included in the Request URI.

For example:

In the case where the HD version of Spiderman is signalled with the CRID: "CRID://sony.com/SpidermanHD", the wild card part of the Request URI would be:
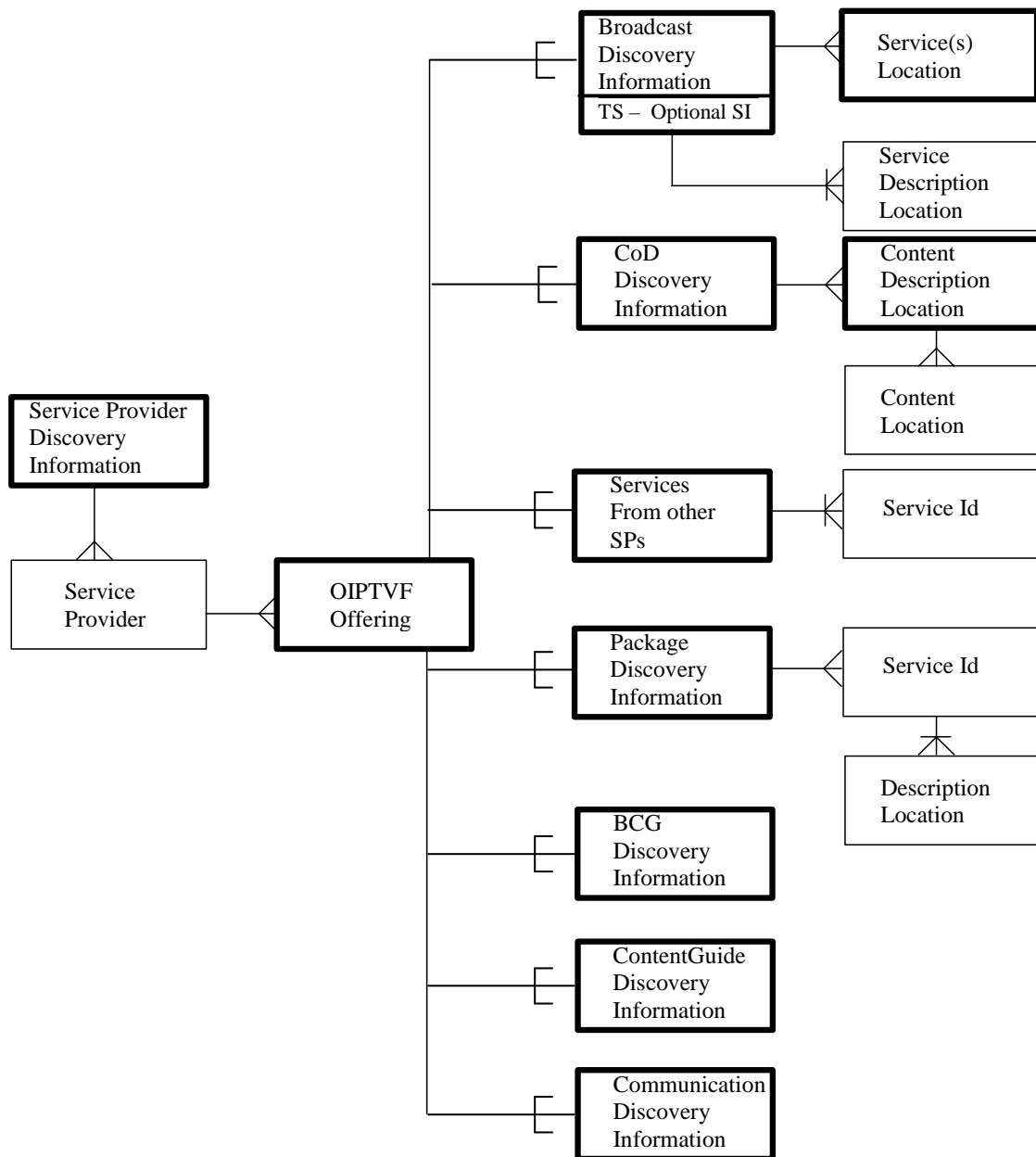
sony.com/SpidermanHD

If however, Spiderman is signalled with the CRID: "CRID://sony.com/Spiderman", and has a HD instance with the IMI: "imi:hd", the wild card part of the Request URI for the HD instance would be:

sony.com/Spiderman#hd

ANNEX A.   Open IPTV Forum SD&S Data Model(Informative)

The Open IPTV Forum service discovery model is represented in the Figure 1.

Figure 6 Open IPTV Forum SD&S Data Model

The "ContentGuide Discovery information" component MAY be used when Service Providers deliver extended BCG metadata via DVBSTP and HTTP. Also, the ContentGuide Discovery information component MAY be used to deliver XHTML-based content guide.

The "Communication Discovery information" component MAY be used for Service Providers to describe URI information of Communication services such as chatting, presence, Instant Message, and Caller-ID. Alternatively, DAE applications MAY be announced using the application signalling extensions to SD&S ServiceProviderDiscovery, Package and IPService elements.

For detailed information on the underlying SD&S data model, please refer to Annex B of SD&S [Ref-1] . Please note that Open IPTV Forum SD&S model does not support "TS-Full SI" in the Broadcast Discovery Information component. Also note that the "CoD Discovery Information" record is deprecated as of version 1.2.1 of SD&S [Ref-1]

ANNEX B.　　Schema Extension for SD&S

All changes and extensions are written in bold.

B.1　Namespace

The namespace for Open IPTV Forum is "urn:oipf:service:sdns:2008".

```
 <?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:service:sdns:2008" xmlns:tns="urn:oipf:service:sdns:2008"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:tva="urn:tva:metadata:2007"
xmlns:dvb="urn:dvb:ipi:sdns:2006" xmlns:dvbmhp="urn:dvb:mhp:2006"
xmlns:oipfbcg="urn:oipf:service:bcg:2008" >
<!-- schema filename is service-sdns.xsd -->
```

B.2　Import Namespace and schema

```
<xs:import namespace="urn:tva:metadata:2007" schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
<xs:import namespace="urn:dvb:ipi:sdns:2006" schemaLocation="imports/sdns3r7.xsd"/>
<xs:import namespace="urn:dvb:mhp:2006" schemaLocation="imports/mhpiptv.xsd"/>
<xs:import namespace="urn:oipf:service:bcg:2008" schemaLocation="service-bcg.xsd"/>
```

B.3　Extension for ServiceDiscovery

```
<xs:element name="ServiceDiscovery">
  <xs:complexType>
    <xs:choice>
      <xs:element name="BroadcastDiscovery" type="dvb:BroadcastOffering" maxOccurs="unbounded"/>
      <xs:element name="CoDDiscovery" type="dvb:CoDOffering" maxOccurs="unbounded"/>
      <xs:element name="ServicesFromOtherSP" type="dvb:ReferencedServices" maxOccurs="unbounded"/>
      <xs:element name="PackageDiscovery" type="dvb:PackagedServices" maxOccurs="unbounded"/>
      <xs:element name="ServiceProviderDiscovery" type="tns:ServiceProvider" maxOccurs="unbounded"/>
      <xs:element name="BCGDiscovery" type="dvb:BCGOffering" maxOccurs="unbounded"/>
      <xs:element name="ContentGuideDiscovery" type="tns:ContentGuideOffering"
      maxOccurs="unbounded"/>
      <xs:element name="CommunicationDiscovery" type="tns:CommunicationOffering"/>
    </xs:choice>
    <xs:attribute name="Version" type="dvb:Version" use="optional"/>
  </xs:complexType>
</xs:element>
```

B.4　CommunicationOffering

```
<xs:complexType name="CommunicationOffering">
  <xs:complexContent>
    <xs:extension base="dvb:OfferingBase">
      <xs:sequence>
        <xs:element name="InitialAppLoc" type="xs:anyURI"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

B.5　Extension for ServiceProvider Type

Please refer to Clause 10.16 and Annex AR of [Ref-9] for details of the ApplicationList extension schema.

```
<xs:complexType name="ServiceProvider">
  <xs:sequence>
    <xs:element name="ServiceProvider" maxOccurs="unbounded">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="Name" type="dvb:MultilingualType" maxOccurs="unbounded"/>
          <xs:element name="Description" type="dvb:MultilingualType" minOccurs="0"
              maxOccurs="unbounded"/>
          <xs:element name="Offering" type="tns:OfferingListType" minOccurs="0"/>
          <xs:element name="ApplicationList" type="dvbmhp:ApplicationList" minOccurs="0"/>
        </xs:sequence>
```

```
            <xs:attribute name="DomainName" type="dvb:DomainType" use="required"/>
            <xs:attribute name="Version" type="dvb:Version" use="required"/>
            <xs:attribute name="LogoURI" type="xs:anyURI" use="optional"/>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
</xs:complexType>
```

B.6   Extension for OfferingList Type

```
<xs:complexType name="OfferingListType">
  <xs:choice maxOccurs="unbounded">
    <xs:element name="Push" type="dvb:DVBSTPTransportModeType"/>
    <xs:element name="Pull">
      <xs:complexType>
        <xs:complexContent>
          <xs:extension base="dvb:PayloadList">
            <xs:attribute name="Location" type="dvb:PullURL" use="required"/>
          </xs:extension>
        </xs:complexContent>
      </xs:complexType>
    </xs:element>
    <xs:element name="WebOfferingLoc" type="dvb:DescriptionLocation"/>
  </xs:choice>
</xs:complexType>
```

B.7   ContentGuideOffering

```
<xs:complexType name="ContentGuideOffering">
  <xs:complexContent>
    <xs:extension base="dvb:OfferingBase">
      <xs:sequence>
        <xs:element name="BCG" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="Name" type="dvb:MultilingualType" maxOccurs="unbounded"/>
              <xs:element name="Description" type="dvb:MultilingualType" minOccurs="0"
              maxOccurs="unbounded"/>
              <xs:element name="TransportMode" type="tns:TransportModeType"/>
              <xs:element name="Logo" type="xs:anyURI" minOccurs="0"/>
              <xs:element name="Type" type="tva:ControlledTermType" minOccurs="0"/>
              <xs:element name="TargetProvider" type="dvb:DomainType" minOccurs="0"
              maxOccurs="unbounded"/>
              <xs:element name="BCGProviderName" type="dvb:MultilingualType" minOccurs="0"
              maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="Id" type="tva:TVAIDType" use="required"/>
            <xs:attribute name="Version" type="dvb:Version" use="optional"/>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

B.8   Extension for TransportModeType

```
<xs:complexType name="TransportModeType">
  <xs:choice maxOccurs="unbounded">
    <xs:element name="DVBSTP" type="dvb:DVBSTPTransportModeType"/>
    <xs:element name="HTTP" type="dvb:HTTPTransportModeType"/>
    <xs:element name="ContentGuideLoc" type="dvb:DescriptionLocation"/>
  </xs:choice>
</xs:complexType>
```

B.9   Extension for Package

```
<xs:complexType name="Package">
  <xs:complexContent>
    <xs:extension base="dvb:Package">
```

```
      <xs:sequence>
        <xs:element name="ApplicationList" type="dvbmhp:ApplicationList" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

B.10 Extension for IPService

The ApplicationList extension is defined in MHP Specification [Ref-9] Annex AR.

```
<xs:complexType name="IPService">
  <xs:complexContent>
    <xs:extension base="dvb:IPService">
      <xs:sequence>
        <xs:element name="TimeToRenegotiate" type="xs:duration" minOccurs="0"/>
        <xs:element name="PurchaseItem" type="oipfbcg:PurchaseItemType" minOccurs="0"/>
        <xs:element name="ApplicationList" type="dvbmhp:ApplicationList" minOccurs="0"/>
        <xs:element name="FileFormat" type="tva:ControlledTermType" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

B.11 WebApplicationDescriptor

For applications announced using ApplicationList, this descriptor SHALL be used to signal CE-HTML applications. The URL SHALL be the URL of the first page of the application.

```
<xs:complexType name="WebApplicationDescriptor">
  <xs:sequence>
    <xs:element name="location" type="dvb:DescriptionLocation" />
  </xs:sequence>
</xs:complexType>
```

B.12 Application Extension

The following extension to the Application type (see [Ref-9]) is defined to incorporate a FLUTESessionDescriptor (see Annex B.13)

```
<xs:complexType name="Application">
  <xs:complexContent>
    <xs:extension base=" dvbmhp:Application">
      <xs:sequence>
        <xs:element name="fluteSessionDescriptor" type="tns:FLUTESessionDescriptor" minOccurs="0"
maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexType>
</xs:complexType>
```

B.13 FLUTESessionDescriptor

The following extension is defined to the XML AIT to signal the session parameters needed for delivery of applications using FLUTE.

Parameters SHALL be as defined in section 6.1.13 'File delivery session description with SDP' of [Ref-18] .

This element is optional; if it is not supported, it SHALL be silently ignored without causing an error.

```
<xs:complexType name="FLUTEsessionDescriptor">
  <xs:sequence>
    <xs:element name="senderIP" type="xs:string"/>
    <xs:element name="numChannels" type="xs:unsignedInt"/>
    <xs:element name="destIP" type="xs:string"/>
    <xs:element name="TSI" type="xs:unsignedInt"/>
    <xs:element name="sessionTimeParam" type="xs:string"/>
    <xs:element name="lang" type="xs:string"/>
  </xs:sequence>
```

```
</xs:complexType>
```

ANNEX C. Schema Extension for BCG

C.1 Namespace

The namespace for Open IPTV Forum is "urn:oipf:service:bcg:2008".

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:bcg:2008" xmlns:tns="urn:oipf:bcg:2008"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:tva="urn:tva:metadata:2007"
elementFormDefault="qualified" attributeFormDefault="unqualified">
<!-- schema filename is service-bcg.xsd -->
```

C.2 Import Namespace and schema

```
<xs:import namespace="urn:tva:metadata:2007" schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
```

C.3 Include definitions

```
<xs:include schemaLocation="csp-MarlinPrivateDataType.xsd"/>
<xs:include schemaLocation="csp-DRMPrivateDataType.xsd"/>
<xs:include schemaLocation="csp-HexBinaryPrivateDataType.xsd"/>
```

C.4 Extension for PurchaseItem Type

```
<xs:complexType name="PurchaseItemType">
  <xs:complexContent>
   <xs:extension base="tva:PurchaseItemType">
    <xs:sequence>
     <xs:element name="DRMControlInformation" type="tns:DRMControlInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
   </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="DRMControlInformationType">
 <xs:sequence>
  <xs:element name="DRMSystemID" type="xs:anyURI"/>
  <xs:element name="DRMContentID" type="xs:anyURI"/>
  <xs:element name="RightsIssuerURL" type="xs:anyURI" minOccurs="0"/>
  <xs:element name="SilentRightsURL" type="xs:anyURI" minOccurs="0"/>
  <xs:element name="PreviewRightsURL" type="xs:anyURI" minOccurs="0"/>
  <xs:element name="DoNotRecord" type="xs:boolean" minOccurs="0"/>
  <xs:element name="DoNotTimeShift" type="xs:boolean" minOccurs="0"/>
  <xs:element ref="tns:DRMGenericData" minOccurs="0" maxOccurs="unbounded"/>
  <xs:element ref="tns:DRMPrivateData" minOccurs="0" maxOccurs="unbounded"/>
 </xs:sequence>
</xs:complexType>

<xs:element name="DRMGenericData" type="tns:DRMGenericDataType"/>
<xs:element name="DRMPrivateData" type="tns:DRMPrivateDataType"/>
<xs:element name="MarlinPrivateData" type="tns:MarlinPrivateDataType"
substitutionGroup="tns:DRMPrivateData"/>
<xs:element name="HexBinaryPrivateData" type="tns:HexBinaryPrivateDataType"
substitutionGroup="tns:DRMPrivateData"/>

<xs:complexType name="DRMGenericDataType">
 <xs:sequence>
  <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
 </xs:sequence>
</xs:complexType>
```

C.5 Extension for OnDemandProgram Type

```
<xs:complexType name="OnDemandProgramType">
 <xs:complexContent>
  <xs:extension base="tva:OnDemandProgramType">
   <xs:sequence>
    <xs:element name="Protocol" type="tva:ControlledTermType" minOccurs="0"/>
```

```
   </xs:sequence>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
```

ANNEX D. BCG Classification Schemes Extensions

An informative set of Classification Schemes has been developed by Open IPTV Forum to provide default set of classification terms to be applied in the context of Open IPTV Forum services.

D.1 VisualCodingFormatCS

The following Classification Scheme is introduced according to the Table.1 and Table.2 defined in clause 3 of Media Formats Specification [Ref-6] **Error! Reference source not found.**.

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:VisualCodingFormatCS">
<!-- schema file is cs-VisualCodinfFormatCS.xml -->
 <Term termId="AVC_HD_25">
  <Name xml:lang="en">AVC_HD_25</Name>
  <Definition xml:lang="en">H.264/AVC video coding, High Definition, 25Hz systems</Definition>
 </Term>
 <Term termId="AVC_HD_30">
  <Name xml:lang="en">AVC_HD_30</Name>
  <Definition xml:lang="en">H.264/AVC video coding, High Definition, 30Hz systems</Definition>
 </Term>
 <Term termId="AVC_SD_25">
  <Name xml:lang="en">AVC_SD_25</Name>
  <Definition xml:lang="en">H.264/AVC video coding, Standard Definition, 25Hz systems</Definition>
 </Term>
 <Term termId="AVC_SD_30">
  <Name xml:lang="en">AVC_SD_30</Name>
  <Definition xml:lang="en">H.264/AVC video coding, Standard Definition, 30Hz systems</Definition>
 </Term>
 <Term termId="MPEG2_HD_25">
  <Name xml:lang="en">MPEG2_HD_25</Name>
  <Definition xml:lang="en">MPEG-2 video coding, High Definition, 25Hz systems</Definition>
 </Term>
 <Term termId="MPEG2_SD_25">
  <Name xml:lang="en">MPEG2_SD_25</Name>
  <Definition xml:lang="en">MPEG-2 video coding, Standard Definition, 25Hz systems</Definition>
 </Term>
 </ClassificationScheme>
```

D.2 AudioCodingFormatCS

The following Classification Scheme is introduced according to the Table.1 and Table.2 defined in clause 3 of Media Formats Specification [Ref-6] .

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:AudioCodingFormatCS">
 <!-- schema file is cs-AudioCodingFormatCS.xml -->
 <Term termId="HE_AAC">
  <Name xml:lang="en">HE_AAC</Name>
  <Definition xml:lang="en">HE-AAC and AAC audio coding</Definition>
 </Term>
 <Term termId="AC3">
  <Name xml:lang="en">AC3</Name>
  <Definition xml:lang="en">AC3 audio coding</Definition>
 </Term>
 <Term termId="MPEG1_L2">
  <Name xml:lang="en">MPEG1_L2</Name>
  <Definition xml:lang="en">MPEG-1 Layer II audio coding</Definition>
 </Term>
 <Term termId="MPEG1_L3">
  <Name xml:lang="en">MPEG1_L3</Name>
  <Definition xml:lang="en">MPEG-1 Layer III audio coding</Definition>
 </Term>
 <Term termId="WAV">
  <Name xml:lang="en">WAV</Name>
  <Definition xml:lang="en">WAV audio coding</Definition>
 </Term>
</ClassificationScheme>
```

D.3 AVMediaFormatCS

The following Classification Scheme is introduced according to the Table.3 defined in clause 3 of Media Formats Specification [Ref-6] .

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:AVMediaFormatCS">
 <!-- schema file is cs-AVMediaFormatCS.xml -->
 <Term termId="TS">
  <Name xml:lang="en">TS</Name>
  <Definition xml:lang="en">MPEG-2 transport stream</Definition>
 </Term>
 <Term termId="TS_BBTS">
  <Name xml:lang="en">TS_BBTS</Name>
  <Definition xml:lang="en">MPEG-2 transport stream, Marlin BB TS with AES encryption</Definition>
 </Term>
<Term termId="TS_PF">
  <Name xml:lang="en">TS_PF</Name>
  <Definition xml:lang="en">MPEG-2 protected transport stream</Definition>
 </Term>
 <Term termId="TTS">
  <Name xml:lang="en">TTS</Name>
  <Definition xml:lang="en">MPEG-2 time stamped transport stream</Definition>
 </Term>
 <Term termId="TTS_BBTS">
  <Name xml:lang="en">TTS_BBTS</Name>
  <Definition xml:lang="en">MPEG-2 time stamped transport stream, Marlin BB TS with AES
encryption</Definition>
 </Term>
<Term termId="TTS_PF">
  <Name xml:lang="en">TTS_PF</Name>
  <Definition xml:lang="en">MPEG-2 time stamped protected transport stream</Definition>
 </Term>
 <Term termId="MP4">
 <Name xml:lang="en">MP4</Name>
  <Definition xml:lang="en">MP4 File Format</Definition>
 </Term>
 <Term termId="MP4_PDCF">
  <Name xml:lang="en">MP4_PDCF</Name>
  <Definition xml:lang="en">MP4 File Format, OMA PDCF</Definition>
 </Term>
 <Term termId="MP4_MIPMP">
 <Name xml:lang="en">MP4_MIPMP</Name>
  <Definition xml:lang="en">MP4 File Format, Marlin IP MP format</Definition>
 </Term>
 <Term termId="MP4_DCF">
  <Name xml:lang="en">MP4_DCF</Name>
  <Definition xml:lang="en">MP4 File Format, OMA DCF</Definition>
 </Term>
</ClassificationScheme>
```

D.4 ProtocolCS

The following Classification Scheme is introduced according to the protocols defined Table.51 of Annex.F.1 in Protocols Specification [Ref-7] .

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:ProtocolCS">
 <!-- schema file is cs-ProtocolCS.xml -->
 <Term termId="sip-igmp-rtp-udp">
  <Name xml:lang="en">sip-igmp-rtp-udp </Name>
  <Definition xml:lang="en">Scheduled Content over RTP</Definition>
 </Term>
 <Term termId="sip-igmp-udp">
  <Name xml:lang="en">sip-igmp-udp</Name>
  <Definition xml:lang="en">Scheduled Content over UDP</Definition>
 </Term>
 <Term termId="sip-rtsp-rtp-udp">
  <Name xml:lang="en">sip-rtsp-rtp-udp</Name>
  <Definition xml:lang="en">Managed CoD Streaming over RTP</Definition>
 </Term>
 <Term termId="sip-rtsp-udp">
  <Name xml:lang="en">sip-rtsp-udp</Name>
  <Definition xml:lang="en">Managed CoD Streaming over direct UDP</Definition>
```

```
 </Term>
 <Term termId="rtsp-rtp-udp">
  <Name xml:lang="en">rtsp-rtp-udp</Name>
  <Definition xml:lang="en">Unmanaged CoD Streaming over RTP</Definition>
 </Term>
 <Term termId="http-get">
   <Name xml:lang="en">http-get</Name>
   <Definition xml:lang="en">Managed/Unmanaged CoD Streaming/Download over HTTP</Definition>
 </Term>
</ClassificationScheme>
```

D.5   GermanyFSKCS

The following Classification Scheme is introduced according to the rating type 9, GermanyFSK rating system defined in Table.11 in [Ref-17] clause 7.2.1.1

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:GermanyFSKCS"
    domain="//CreationInformation/Classification/ParentalGuidance/ParentalRating">
 <!-- schema file is cs-GermanyFSKCS.xml -->
 <Description xml:lang="en">Thesaurus for movie rating</Description>
 <Term termId="0">
  <Name xml:lang="en">0</Name>
  <Definition xml:lang="en">Released without age restriction</Definition>
 </Term>
 <Term termId="6">
  <Name xml:lang="en">6</Name>
  <Definition xml:lang="en">Released to age 6 or older</Definition>
 </Term>
 <Term termId="12">
  <Name xml:lang="en">12</Name>
  <Definition xml:lang="en">Released to age 12 or older and to age 6 or older with parental
guidance</Definition>
 </Term>
 <Term termId="16">
  <Name xml:lang="en">16</Name>
  <Definition xml:lang="en">Released to age 16 or older</Definition>
 </Term>
 <Term termId="18">
  <Name xml:lang="en">18</Name>
  <Definition xml:lang="en">No release to youths (released to age 18 or older)</Definition>
 </Term>
</ClassificationScheme>
```